Data Quality Statement, OCO-2 release of L1b data V5.0

The OCO-2 calibrated radiances are described in more detail in the Data User's Guide and the L1B ATBD. Overall, The L1B data provided in the V5.0 data release are well calibrated geometrically, spectrally, and radiometrically.

Analysis of coastline crossing and lunar measurements show that the geometric reconstruction of the data is good to a few hundred meters.

The wavelength grid of the L1b data is described by the disp_coef_samp variable in the InstrumentHeader folder of the L1bSc data. This wavelength grid was modified by a fraction of a sample from the preflight coefficients, to better fit the observational data. The spectral grid has an uncertainty of the order of 0.05 of a sample.

The full radiometric character of the data is described the by the noise coefficients, which are contained in the snr_coef variable in the InstrumentHeader folder. These noise coefficients describe the radiometric noise for each sample, and each footprint. We believe that these are an accurate or slight underestimate (order 10%) of the radiometric noise. The absolute radiometric calibration is evaluated with a number of methods. We believe that the weak and strong CO2 bands are absolutely calibrated to a few percent. Shortly prior to the data release, we gathered evidence that the a-band absolute radiometric calibration has some time dependence, and there are errors of up to 8% in the data record. We are in processes of applying gain degradation coefficients, but they are not included in the V5.0 release.

There are three other issues that L1b users need to be aware of. These are fully discussed in the data user's guide and L1b ATBD.

For use in XCO2 retrievals, there are samples in each footprints that have been flagged and are not intended to be used. This happens for a number of reasons, including pixels that do not respond properly (called bad pixels). The fourth entry of L1bSc/InstrumentHeader/snr_coef is used to identify bad samples that should be excluded in retrieval algorithms, where only those marked with a zero are intended for use. See the L1b ATBD for more details.

Over the region known as the South Atlantic Anomaly, the OCO-2 data is impacted by cosmic rays at a moderate frequency. These cosmic rays impart signals on the data, and these show up as spikes in the radiance spectra. These spikes are not corrected or flagged in the V5.0 release, although we are testing a method of flagging them for future data releases. At present, we recommend that users either exclude this region (illustrated in the user's guide), or implement a screening to identify spectra that have a significant number of samples with radiances larger than the continuum level. The impacts are primarily in the A-band spectra.

Also, as described fully in the L1b ATBD, the OCO-2 focal planes are slightly rotated relative to the instrument slits. Consequently, a given geographic position does not map onto a single row of pixels on a sensor, but instead varies (roughly linearly) with spectral position (i.e. column). Because geographic positions must ultimately be mapped onto discrete pixels,

the start and end positions of each footprint are adjusted in single pixel increments (i.e., *clocking jumps*) in row space at selected columns. These jumps result in discontinuities in the mean measured radiances if there are sharp gradients in the illumination near the boundaries of the footprints. We are testing a method for correcting the radiances, but that is not included in the V5.0 delivery. Users can screen for impacted data with the color slices that are available. Please refer to the L1b ATBD for details.

Known data issues as of 12/19/2014				
Start Orbit	**End Orbit**	**Issue**	**Impact**	**Date range**
0	485	Door closed/Warm	Science data invalid	8/2/14 - 8/4/14
486	504	Warm	Science data invalid	8/2/14 - 8/5/14
557	640	Door closed	Science data invalid	8/9/14 -8/15/14
768	775	Maneuvers/Door closed	No Science taken	8/23/14 - 8/24/14
878	918	Warm (decontamination)	Science data invalid	8/31/14 - 9/3/14
1082	1084	Maneuvers/Door closed	No Science taken	9/14/14
1648		Door closed	Science data invalid	10/23/14
1649	1686	Door closed/Warm (decontamination)	Science data invalid	10/23/14 - 10/26/14
1687	1721	Door closed	Science data invalid	10/26/14 - 10/28/14
2371	2372	Maneuvers/Special calibration (Full-orbit dark)	No Science taken	12/12/14